



(12) **United States Patent**
Glacer et al.

(10) **Patent No.:** **US 9,679,856 B2**
(45) **Date of Patent:** **Jun. 13, 2017**

(54) **SYSTEM AND METHOD FOR A
MICROFABRICATED FRACTURE TEST
STRUCTURE**

(71) Applicant: **Infineon Technologies AG**, Neubiberg
(DE)

(72) Inventors: **Christoph Glacer**, Munich (DE);
Alfons Dehe, Reutlingen (DE); **John
Brueckner**, Reinsdorf (DE)

(73) Assignee: **Infineon Technologies AG**, Neubiberg
(DE)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 529 days.

(21) Appl. No.: **14/201,260**

(22) Filed: **Mar. 7, 2014**

(65) **Prior Publication Data**

US 2015/0255407 A1 Sep. 10, 2015

(51) **Int. Cl.**

G01R 31/26 (2014.01)

H01L 23/00 (2006.01)

G01N 3/08 (2006.01)

B81C 99/00 (2010.01)

G01N 3/02 (2006.01)

(52) **U.S. Cl.**

CPC **H01L 23/564** (2013.01); **B81C 99/004**
(2013.01); **G01N 3/02** (2013.01); **G01N 3/08**
(2013.01); **G01N 2203/0017** (2013.01); **G01N**
2203/0286 (2013.01); **G01N 2203/0298**
(2013.01); **H01L 2924/0002** (2013.01)

(58) **Field of Classification Search**

None

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,786,621 A 7/1998 Saif et al.
6,466,042 B1 10/2002 Nam
6,567,715 B1 5/2003 Sinclair et al.
2003/0117158 A1 6/2003 Goldbach et al.
(Continued)

FOREIGN PATENT DOCUMENTS

CN 103512508 A 1/2014
CN 103579196 A 2/2014
(Continued)

OTHER PUBLICATIONS

Fabregue et al.; "multipurpose nanomechanical testing machines
revealing the size-dependent strength and high ductility of pure
aluminium submicron films"; Micro & Nano Letters; Apr. 2007, pp.
13-16.*

(Continued)

Primary Examiner — Shaun Campbell

(74) *Attorney, Agent, or Firm* — Slater Matsil, LLP

(57) **ABSTRACT**

According to an embodiment, a micro-fabricated test struc-
ture includes a structure mechanically coupled between two
rigid anchors and disposed above a substrate. The structure
is released from the substrate and includes a test layer
mechanically coupled between the two rigid anchors. The
test layer includes a first region having a first cross-sectional
area and a constricted region having a second cross-sectional
area smaller than the first cross-sectional area. The structure
also includes a first tensile stressed layer disposed on a
surface of the test layer adjacent the first region.

25 Claims, 12 Drawing Sheets

